

# **Historic, Archive Document**

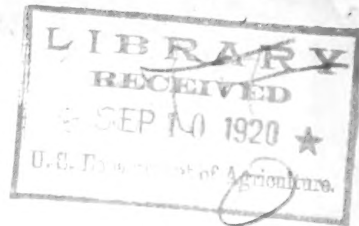
Do not assume content reflects current scientific  
knowledge, policies, or practices



Ind 1710, 95, W.A. 7-0

Sup.

ANNALS, APR 95



1893

• • • PEACH CIRCULAR • • •

OF THE

# NIAGARA RIVER NURSERIES,

HENRY LUTTS, Proprietor,

YOUNGSTOWN, NIAGARA COUNTY, NEW YORK.

**B**EING located in one of the most favorable sections on the American Continent for the cultivation of the Peach, and growing and selling trees of this fruit for the last twenty years, I find that many of the once popular and profitable varieties are failing to meet the requirements of the grower and the demand of the consumer. Among the well known varieties that are now being rapidly discarded as inferior are the Alexander, Early York, Beatrice, Honest John, Hale's Early, Foster, Yellow Alberg, Wheatland, Wager and Morris White.

Their places are being taken by others possessing, and being recommended by valuable qualities, which are fully described in this circular. In former years anything in the shape of a peach would sell for a high price, but now consumers are becoming better posted and more exacting, and the man who in the future makes peach growing profitable, must look well to the varieties he plants.

The peach growing industry here, when properly conducted, surpasses all others. Land adapted to peach growing can be made to return greater profits than can be had from devoting it to any horticultural or agricultural purpose. A well managed peach orchard, considering the capital invested, is thrice more profitable than the best orange groves of Florida, and even California with her vine-clad fields, has nothing so profitable. In no place where this queen of fruit is grown, are crops more certain, and the fruit of this locality has no equal; even the best from Delaware and Maryland have to stand aside when Niagara County Peaches are in the market.

To those not familiar with the peach business, the above may seem overdrawn but I know, after studying and investigating it carefully for twenty years, that they are facts readily proven to those who desire evidence in detail. That my own orchard, at the present time, covers over one hundred acres, should suffice to show that my faith in the industry of growing peaches is not limited to supplying you the trees.

In order to make it a success, as with all other industries, it needs more study and careful attention than the majority of planters at present give it. For the best results certain fixed principals must be carried into effect, and to clearly explain these is the aim of this circular, in which I am trying, both by percept and example, to point out the most important requirements of successful peach growing, and to make some suggestions that may enable you to enter with greater accuracy into the business. I thank you for the past liberal patronage with a feeling, such as can only be produced by the unbounded success that has accompanied my effort to make the Niagara River Nurseries a reliable place at which to purchase your trees, and in the future my endeavors in this direction will not slacken.

By recent purchases I have secured the most perfect nursery soil in this favored fruit belt, and this combined with past experience, places me in a position where I can serve you in a still more satisfactory manner.

My trees are carefully grown, as I give strict personal attention to the business, and am certain that those in need of trees, or information concerning them, will be amply repaid by calling on me and making a personal inspection, and to this end all are invited, as here may be seen great tracts of trees, and in fruiting season, all kinds of fruit grown in this latitude.

One thing in particular that every grower should see at fruiting time, is my experimental orchard of peaches, where may be seen over *one hundred varieties*, grown side by side on the same soil, under the same cultivation.

It was visited last season by a great many people, among whom were some of the most noted horticulturists of the country. The general expression was "I did not know there were so many varieties," and "what fine late peaches." The object of this orchard is to instruct and familiarize myself and others with the habits of the different varieties, and to give me a reliable source from which to procure buds and scions true to name, and it surpasses any like orchard in the United States, and cannot fail to be of great value to all fruit men.

The following concise statements and directions, if studied and adhered to closely and carefully, will certainly enable you to obtain better results than is now secured, even by those who are making the greatest profits from peach growing.

To make peach growing a success, it is necessary to have

1 Soil.	SOIL MAY BE CLASSED
2 Location.	1 Perfect.
3 Varieties.	2 Fair.
4 Cultivation.	3 Poor.

**Perfect peach soil** consists of one composed of an alluvial drift, in which there is a large proportion of sharp sand, and underlaid with a porous subsoil through which the water can rapidly pass away. Favorably located trees live longer, grow larger and bear more uniform crops of large showy fruit on this soil than on any other, because these alluvial drifts contain all the best soil elements, properly blended for ages, this with perfect drainage furnishing all the requirements of the peach.

Parties having such soil can grow peaches with great certainty and but little expense. A fair illustration of an orchard in this section on such soil is found in Mr. J. E. Lloyds, on the Lockport-road, and also in S. Park Bakers, Esq.

**A fair soil** varies from a light sandy loam to clay, and the degree of success depends largely on the skill and management of the owner. Many of our most profitable orchards are located on only fair soil. But the owners by thorough cultivation and by supplying the necessary enriching materials, often cause the public to think that such soil is just the thing for peach growing. A fair illustration of this may be seen in Mr. A. H. Dutton's orchard, on the Lockport-road. His success lies wholly in the thorough and liberal management of his orchard. Here is a plain illustration that peaches can be grown on unfavorable soil with thorough cultivation in a favorable locality, as his orchard has never missed a fair crop since three years old.

There are thousands of acres of better land that can be made to produce fine fruit. But to succeed, the owners must familiarize themselves with the requirements of a peach orchard, *as everything depends on the owner himself*. The most important things to do are: **FIRST**—Select good, strong, well-rooted trees. **SECOND**—Plant with care, so as to insure a good growth the first year. **THIRD**—The cultivation must commence at the very earliest moment in the spring, and continue at intervals of ten days, until mid-summer. **FOURTH**—Be thorough in drainage, not contented with a few shallow surface

drains, but see that the sub-soil is free of stagnant water. More trees die from the effects of water standing on the soil than from all other causes combined. I cannot too strongly impress the necessity of drainage upon you, without it no profitable results may be expected, and he who fails to attend to it cannot become a successful peach grower.

**A poor soil** is one that lays flat, and is composed of black sand, muck or clay. Trees may be grown for a few years, but owing to the lack of healthy growth they are short-lived. Extra care and thorough cultivation may keep them in bearing a few years, but in the majority of cases, the orchards planted on such soil are not profitable.

**Location.**—It is of the utmost importance that you are favorably located to grow all kinds of peaches. In this respect the town of Porter possesses many advantages. Bounded on the west by the ever-flowing Niagara, on the north by Lake Ontario's broad expanse of open water, whose modifying influences reach for miles, the air from the south is tempered by passing over Lake Erie, which reaches far to the east of us, so that extremes are unknown, such as are frequent in more southern localities. As the mercury seldom reaches zero, and still more rarely ten below, we run but little risk of the buds winter-killing here, as most of the varieties will stand zero, and a reasonable amount are uninjured at ten below. In sections where it is colder it will be wise to select from Special Hardy List, named farther on.

The air is chilled during the early spring by the ice and water surrounding us, so that trees do not bloom until late, and so the blossoms are never killed by the late spring frosts, as happens in nearly every other locality. These special advantages should not be overlooked, as they are bound to make this locality famous as a peach growing section, until Niagara River ceases to flow and Lake Ontario runs dry.

**Disease.**—The disease of the peach tree, unfortunately and improperly termed "Yellows," is being thoroughly studied by the United States Department of Vegetable Pathology, at Washington, and the most recent investigation tend to show that it is of fungus origin. My own experience leads me to believe this to be true, and that the fungi only attacks the tree in certain condition of growth, and that it is contagious only under favorable conditions, of which the most important are too late growth in the fall, caused by too late cultivation, resulting in improperly ripened wood. Excessive freezing early in the fall while the leaves are still on, and the limbs and body are full of sap. Exhausting of the vitality by overbearing. Anything that enfeebles the tree and reduces its vitality, favors the development, and without doubt soil, with an excess of moisture in it at times, makes more unhealthy trees and fill the conditions of growth more nicely for disease than all other combined causes.

When once infected there is no remedy known, and the only way is to dig out the tree and burn it up at once. The greatest preventative is favorable location and soil combined. To what extent they go to make up a healthy orchard, may be seen by examining the trees on the Lake road, commencing at Youngstown and going east along the Lake road, may be found a tract of country where trees are longer lived, and bear more regular crops than in any section in the northern states. Trees planted in this section 20 years ago are producing annual crops of the finest fruit to be found in this locality.

The annual crops and the freeness from disease has long been a mystery to those not familiar with the requirements of the peach. But when we stop and consider for a moment the surrounding and conditions under which those orchards are grown, it is obvious that location and soil are the principle points that makes this tract a profitable peach producing section. No special method of cultivation or fertilizers have been adopted, and only the soil and location can be taken into account for the fruitfulness and longevity of the orchards. This soil is a high dry clay loam that has been cropped for at least three generations, the humus has been worked entirely out of the surface soil but the subsoil is rich in potash elements and as soon as the roots work down in it the trees assume that dark rich cast so indicative of good health and liberal feeding. This locality has an atmosphere different from inland section. The air at all times contains moisture in greater quantities than can be found in sections remote from water. The influence of which is clearly shown in foliage and fruit during the long protracted drouth that frequently occurs. In this section dry weather seems more favorable. There are thousands of acres of similar soil scattered throughout the United States, where peaches are not grown and no one thinks of trying them. By planting varieties that are not likely to winter-kill, and by stimulating the growth with chemical fertilizers that contain a large per cent. of potash, a peach tree may be produced that will live and bear paying crops of fruit where no one thinks peaches could be grown. Such was the case on this most favorable locality twenty years ago.

**"The Curl"** is the name commonly given to a malady which often attacks the leaves of the peach tree. It is produced by a parasitic fungus, which develops more freely with certain conditions of weather, the most favorable weathers is warm alternated with cold. It usually appears in May or June, and attacks the first leaves which curl up, becomes thickened and swollen with hollows on the under and reddish swellings on the upper sides, and finally after two or three weeks fall off. It greatly weakens the vitality of the tree when badly infested, and as yet, no remedy has been applied that effectually routs it. The best treatment is early and thorough working of the soil and a stimulant of from three to five pounds of Nitrate of Soda, per tree, thoroughly worked in the soil early in the spring.

**Peach Rot**—Is of fungus origin and develops very rapidly during favorable weather, which is warmth and moisture combined. The preventative is picking and carrying out of the orchard every decayed specimen. It is carried through the winter by the decayed and dried peaches left hanging on the branches all winter, which should be picked and burnt by April 1st and the trees thoroughly sprayed by that time with the Bordeaux mixture.

**Insects**—The peach is less subject to the ravages of insects than any fruit we grow. The insects most detrimental are the Borer and the Curculio. The Peach Borer does great mischief to this tree by girdling and devouring the whole circle of bark just below the surface of the ground. Many trees die annually from this cause, and the owners attribute it to some disease.

The insect in its perfect state is a slender, dark-blue, four-winged moth, somewhat resembling a wasp. It commences depositing its eggs in the soft and tender bark at the base of the trunk, usually about the middle of June and continues until September. The eggs soon hatch and become a small white grub, with a red head, it eventually grows to three-quarters of an inch long, penetrates and devours the bark and sap-wood, and after passing the winter in the tree, it enfolds itself in a cocoon, under or upon the bark, and emerges again in a perfect or winged form, in June, and commences depositing its eggs for another generation.

It is not difficult to rid our trees of this enemy, in fact, nothing is easier to him who is willing to devote a few moments every season to each tree. The most effectual method is to remove the earth away from the base of the tree, when the appearance of gum or castings, quickly indicate the locality of the borer. A piece of pliable wire may be inserted in the hole, and the insect speedily destroyed by probing. After the borers have been thoroughly taken out, a very good protector may be found by using a thick wash, composed of two parts water lime and one of yellow clay, in which has been mixed a quart of salt and two oz. of carbolic acid to each bushel. This should be applied with a stiff brush the later part of May.

**Curculio.**—But the greatest insect enemy of the peach, at the present time, is undoubtedly the Curculio, which of late years has become so numerous as to almost destroy crops from the light bloom that frequently follows an excessive crop. Their habits are so sly that the general observer scarcely knows of their presence until the crop is destroyed. When there is a light bloom the orchardist should be on the alert, and as soon as the fruit is the size of a pea, a strong system of warfare should commence. At the recent meeting of the Western New York Horticultural Society, the best posted members favored the jarring system, and that spraying was unsafe with any of the arsenical solutions, as the foliage of the peach was so delicate and susceptible to injury when any of the arcenite solutions were used in quantities sufficient to repel the Curculio.

J. H. Hale, the veteran peach grower from Connecticut, stated, we may expect a full crop of fruit, even when 80 per cent. of the buds are winter-killed, if we will only protect the balance from the ravages of this insect. The season of 1892 will long be remembered as one in which the Curculio done thousands of dollars of damages to the fruit in this section. The crop of all the smooth skin varieties was entirely destroyed before the growers realized that they were at work. Since the introduction of the Alexander, Early Rivers, and peaches of that class, we seem to have reared up a generation of Curculio that work with a greater persistency on the peach than in former years. The eggs of this insect matures in all of those early peaches, and now, no one that cultivates the peach for profit, can afford to let this insect work unmolested in his orchard, and especially when over 50 per cent. of the buds have been winter-killed. The varieties most affected are those free from down or wool, such as Alexander, Early Rivers, Crawford's Early and Globe. While those less liable are Hill's Chili, Yellow

Alberg, Smock's and Salway. The cut here shows the Curculio, full size, at work, and its mark in which it deposits its egg near it. The greatest damage is done during the month of June, after that time the egg seldom develops in a grub or larva, and black gummy spots on the fruit is the results of its puncture. My own positive knowledge of this insect leads me to believe that in almost every section in the United States where peach trees can be grown, that there is always fruit buds enough that survive the coldest weather to produce a full crop, were it not for the ravages of this insect. Many an orchardist has watched his trees bloom and the fruit set, and noticed the crop dropping from day to day, until at picking time there could be found only few gnarled and gummy specimens, without ever suspecting the real cause. I practice the jarring method and have never failed to have a crop of peaches in 15 years.



**Pruning.**—As the peach is a delicate and sensitive tree, and subject to injury from severe frosts, they should not be cut until all danger of extreme cold is over. My system has been to commence about the 20th of March, and thin out all surplus branches and shoots, and cut back from one-half to two-thirds of the previous season's growth. This treatment ensures a vigorous growth of wood and bears the following year. Few persons are aware how much the size and beauty of the fruit depends on the size and vigor of the leaves. A tree covered with large healthy foliage, where a thorough system of thinning out the surplus branches and wood has been practiced, invariably produces fruit of extraordinary size, and of fine quality. Such fruit always sells for double the price of common grades.

**Planting.**—Plant eighteen feet apart each way, one hundred and thirty-four trees per acre; on light, sandy land, sixteen feet apart each way, one hundred and seventy trees per acre. Spring is to be preferred for planting the peach.

---

## VARIETIES.

---

As the profits of an orchard depends largely on the varieties planted. The best and most successful orchardists are in favor of planting varieties that will make a succession from early to late. The proportion of each being determined by the market and the location. Where all varieties grow to perfection, as they do here, it is much easier to make a selection than in sections where only a few of the hardiest can be relied on. To beginners the selection of varieties adapted to his particular locality, is no light task. Many varieties are grown under local name by conscientious nurserymen who have never made the peach a study, and the results are planters often find varieties different that ripen at different seasons from what they expected when the trees came into bearing. This often makes a great quantity fruit at one season, and a shortage at another. Again losses occur by planting varieties adapted to only particular location. It is a well established fact that location and soil have very much to do with the success of some varieties; for while Alexander, Hale's Early, Yellow Alberg, Beer's Smock and Salway, are generally classed among the most hardy and reliable. There is sections where they prove worthless and are unprofitable to plant. In the following list you can select, according to your location, varieties that will give you a continued succession, from July until January. Many of them may be new to you, but all possess valuable qualities, as I know from actual experience in cultivating them, and it is for the planter to determine which will suit his particular wants. In some sections hardiness is the greatest requisite. For such I have selected varieties that are unequalled, others require earliness. To those I can say the list cannot be bettered, with our present known varieties I have also classified the valuable for canning, which are marked with a letter "C." You must know the requirements of your locality, and if medium hardiness is required, plant those with a single star. If very hardy varieties are required, plant those with a double star.

**\*Arkansas Traveler.**—FIRST RIPENING.—This valuable new peach has been fruited in nearly all peach-growing regions. It ripens from five to six days earlier than the Alexander, of which it is a seedling. It is one of the most attractive varieties of recent introduction. The fruit is of large size, good quality, and remarkably handsome. Tree, a good grower, very hardy, and an enormous bearer. Season, July 20 to August 1. \*

**\*\*Alexander.**—SECOND RIPENING.—Too well known to describe. It has little to recommend it but hardiness. It can be planted to make a succession, and when the fruit is properly thinned early, it is a large, showy peach. \*

**\*\*\*Early Rivers.**—THIRD RIPENING.—Large size; pale straw-color, with a faint pink cheek; extremely hardy, never failing to bear full crops in this section, which is its greatest recommend.

**\*\*\*Champion.**—FOURTH RIPENING.—It has been carefully tested for a series of years and proves itself a remarkably early peach. It bears full crops when all other varieties fail, proving itself one of the hardiest peaches known. It is also remarkable for size and good quality, many specimens measuring 10 inches in circumference. Skin is of a rich creamy white, with a red cheek, exceedingly handsome; flesh, creamy white, firm, sweet and delicious, rich and juicy; a perfect freestone; ripens with Early Rivers, and will entirely supercede that once popular variety when better known.

**\*Hyne's Surprise.**—FIFTH RIPENING.—This is a freestone, and is really a magnificent peach. Large size, fine color, sweet and juicy; parts readily from the stone, which makes it the most desirable of all early peaches. Resembles Mountain Rose, but ten days earlier. It is a rank grower, very hardy, and commences to bear the second year after planting. My first orchard of it contained 100 trees, from which I picked 100 baskets, when planted thirty months. They sold in the orchard for \$1.00 per basket, which surprised me, so I have since planted 1,000 trees. Mr. Charles and Robert Currie, of Niagara, Ont., planted one hundred trees at the same time from which they secured, at thirty months, \$96.00; the following year, \$265.00, and last year, \$640.00—or about \$1,000 when the trees were four years old.

**\*\*Mountain Rose.**—SIXTH RIPENING.—In 1890, when most of the standard varieties failed, it bore a heavy crop. Ripens

just in advance of Crawford's Early. It should always be picked when hard, just as soon as it gets size and color. It will ripen nicely when picked quite green. It comes at a time when peaches are wanted. Of medium size; white, nearly covered with a bright carmine blush; flesh white, melting; abounding with rich, sweet juice; one of the best and most reliable early peaches; vigorous and productive; freestone. Last of August.

**\*Yellow St. John's.**—Nearly the size of Crawford's Early, and equal to it in beauty, more productive, of better quality, and comes in just before that most popular peach; orange yellow, with a deep red cheek; flesh, golden yellow, sweet and excellent. Its earliness combined with hardiness, and fine appearance, make it a very desirable variety. C

**Foster.**—Large, deep orange, becoming very dark red on the sunny side; flesh yellow, very rich and juicy, with sub-acid flavor; ripens with Early Crawford; very handsome.

**Crawford Early.**—SEVENTH RIPENING.—This very beautiful and best of all yellow-flesh peaches, is scarcely surpassed by any other variety in size and beauty of appearance. As a market fruit it is perhaps the most popular peach grown. Fruit very large, oblong; skin yellow, with a fine red cheek; flesh yellow, juicy, sweet and excellent; tree very vigorous, productive and well adapted to this locality. C

**Elberta.**—Perhaps no peach which has been introduced in the past ten years has created such a stir, or is entitled to such universal recognition as the Elberta. It is of large size, beautiful color, yellow and red; delicious quality, a vigorous grower, one of the most productive on all soils in cultivation, and last, but not least, is a good shipper, possessing the quality to "stand up" under all conditions. The tree comes into bearing very young and is distinct in growth from anything else. J. H. Hale, the famous Connecticut peach grower, has this year planted 5,000 trees of this variety alone. C

**Hance's Golden.**—Almost round, large, very beautiful, yellow with rich crimson cheek, and of highest quality; a sure and heavy cropper, ripening with Crawford's Early. C

**Mary's Choice.**—A large and beautiful yellow peach of the highest quality, ripening after the Early Crawford; in size and form closely resembling that variety, but superior to it in quality.



**Reeves' Favorite.**—The largest of all yellow-fleshed peaches; dull red cheek on a greenish-yellow skin, very thick skin, which makes it a valuable variety to ship long distances; flesh yellow and coarse, juicy and sweet; fair bearer; sells for the highest market price, during the fall of 1889 it brought \$2.50 per basket in Buffalo market. My trees, in 1890, when Crawford's Early failed entirely, bore three to four baskets per tree, which sold in the orchard at \$2.00 per basket. This variety has been grown by many as Foster, and of late years many have supposed it to be Wheatland; ripens close after Crawford's Early, which makes it a valuable variety to grow. C

**\*Pratt.**—Large, yellow, nearly covered with red; flesh yellow, tender, sweet and juicy; in all respects an improved Alberg; splendid for canning; especially valuable for its hardiness and reliability. This variety should be planted where peaches are liable to winter-kill. C

**Jacques' Rareripe.**—Large, roundish; dark yellow, shaded with dull red; flesh yellow, juicy, slightly sub-acid.

**\*\*\*Crosbey Peach** is of bright yellow, medium size, fine quality, freestone, with small pit, an enormous bearer, and fruits every year, because its fruit buds are more hardy than most other varieties. It's almost an iron clad, for it fruits when all others fail. If you want to be sure of peaches every year, plant Crosbey. C

Price on Crosby Peach, first-class, 75 cts. each, \$50 per 100; June buds, 50 cts. each, \$25 per 100; Dormant buds, 5 for \$1, or \$15 per 100.

**\*Old Mixon Free.**—EIGHTH RIPENING.—Almost too well known to need description; an old "gilt-edged" variety, without a fault; white, with red cheek; productive and profitable. C

**\*\*Wager.**—Yellow skin and flesh; good for canning; very hardy; generally to small.

**\*\*\*Bill's Chili.**—Medium size, dull yellow, tree very hardy, a good bearer.

**\*\*Stephen's Rareripe.**—Large, white-shaded and mottled red; flesh white, juicy, vinous and of high quality; hardy; a heavy and regular bearer. Last of September.

**Chair's Choice.**—Of the largest size; deep yellow with red cheek; flesh very firm; unsurpassed, either as a desert fruit or canned. Ripens midway between Crawford's Early and Late. This is the handsome peach I have fruited out of 100 varieties. It has no superior in either quality or flavor and for profit is without a rival. C

**Lemon Cling.**—Clingstone. Is one

of the largest and most beautiful of all the yellow-fleshed clings; very productive and hardy.

**Crawford's Late.**—A magnificent late peach where it does well, but unreliable in this section and should not be planted.

**Beer's Late.**—A seedling of Crawford's Late, with which it ripens, and differs only in being smaller and a more regular and abundant bearer. C

**Globe.**—The tree is a rapid, vigorous grower, and an enormous bearer. Fruit exceedingly large, globular in form, maintaining its size uniformly; of a rich golden yellow, with red blush; flesh very firm, but juicy, yellow, shaded with a reddish tinge toward the pit, freestone; in every respect superior to Crawford's Late, with which it ripens. Lasts a week longer and, on account of its firmness, it is admirably adapted for distant markets. C

**Prize.**—Resembling Crawford's Late, but somewhat larger, and ripening five to eight days later.

**Ward's Late.**—Large; white, with red cheek; rich, sprightly and luscious; a valuable late market variety.

**\*\*Smock Beer's.**—A seedling of Smock Free, similar in character, but much improved. The tree a vigorous grower and considered one of the most profitable disseminated. Well calculated for distant market shipments, and is also very desirable for canning and drying purposes, a branch of business that is yearly becoming more important.

**Sener.**—Large, yellow, with deep red cheek; yellow flesh, deep pink around the stone; freestone, rich and very juicy. Ripens about October 10th.

**Picquet's Late.**—Large, yellow flesh, free, skin yellow, blushed somewhat and usually has scattered about over it numerous small black spots. This variety belongs to the Indian type and while it is inclined to crack before maturity in a wet season, with favorable weather it is very fine; the tree is a strong grower and a sure heavy bearer.

**\*\*Saltway.**—A very late variety that has been cultivated in this locality for 20 years. Since growers have become acquainted with its peculiar character they prize it highly. It is of large size, extremely handsome when well grown. Hardy both in bud and bloom and with me has never missed bearing a crop in twenty years. This variety may be picked from the tree when green and stored away and kept for months. It is a good canner and highly prized by all who are acquainted with it. C

ESTABLISHED 1872.

# NIAGARA RIVER NURSERIES,

HENRY LUTTS, PROPRIETOR.

---

**SPECIALTIES:**

JAPAN PLUMS.

OGON, BOTAN, BURBANK, SATSUMA.

---



---

**NEW VARIETIES:**

GRAND DUKE, LINCOLN, SARATOGA.

---

Youngstown, N. Y., ..... 189